

**PUBLIC PARTICIPATION RESPONSIVENESS SUMMARY
FOR
567 Iowa Administrative Code Chapter 32 “Animal Feeding Operations Field Study”
Addition of Health Effects Value/Health Effects Standard for Hydrogen Sulfide
7/19/04**

INTRODUCTION

On December 15, 2003, the Environmental Protection Commission approved a Notice of Intended Action (NOIA) to amend Chapter 20 “Scope of Title-Definitions-Forms-Rules of Practice” and Chapter 32 “Health Effects Value (HEV)”. The Notice of Intended Action (NOIA) was published in the Iowa Administrative Bulletin (IAB) on January 7, 2004, as ARC 3092B. An amended NOIA to add an additional public hearing was published in the IAB on March 31, 2004, as ARC 3261B. An informational hearing was held December 12, 2003 at 1 P.M. in the conference rooms of the Air Quality Bureau, located at 7900 Hickman Road, Suite 1, Urbandale, Iowa. Six public hearings were held as stated below:

February 17, 2004 at 7 P.M. at Iowa Lakes Community College’s Gateway North Center, located at 1900 North Grand Avenue in Spencer, Iowa.

February 25, 2004 at 7 P.M. at the Cass County Community Center, located at 805 West 10th Street in Atlantic, Iowa.

March 3, 2004 at 6 P.M. at the Mason City Public Library, located at 225 2nd Street SE in Mason City, Iowa.

March 8, 2004 at 6:30 P.M. at the Davenport Public Library, located at 321 Main Street in Davenport, Iowa.

March 11, 2004 at 7 P.M. at the Clarion Hotel and Conference Center, located at 11490 Hickman Road in Clive, Iowa.

April 1, 2004 at 6:30 P.M. at the North Iowa Community College Muse-Norris Center, located at 500 College Drive in Mason City, Iowa.

PUBLIC COMMENTS

Comments were submitted orally and/or in writing during the public comment period, which ran from January 7 to April 8, 2004. A total of 263 oral comments and 2,702 written comments were received. This document is the department’s official response to all comments received. Comments are summarized and classified according to content. Comments with similar content are grouped together, so rather than responding to each comment individually, only one departmental response was developed for each group of comments.

The department appreciates those individuals and organizations submitting comments regarding this rulemaking. Each comment was carefully considered.

Please note: Comments received by the department that did not contain subject matter directly pertaining to the content of the proposed rule are not reproduced in this document.

ORGANIZATION

Departmental Responses to each comment are organized as follows:

- Summary Statement – A summary statement is given which concisely summarizes the content and overall general idea of the comments.
- Response - The departmental response contains the reasoning and logic behind any actions, such as corrections or alterations, that were made to the proposed rule, or discusses why no such action was taken.
- Recommended Action- This section outlines any changes made to the proposed rule after consideration of public comments.

Responses are divided into the following categories:

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Appendix A contains the language found in Iowa Code section 459.207, referenced throughout.

Appendix B contains the proposed rule and Iowa Air Sampling Manual as presented in the Notice of Intended Action.

Appendix C contains the rule and Iowa Air Sampling Manual as recommended for final adoption after changes were made based on public comment.

Appendix D contains Governor Vilsack's veto message for House File 2523.

Appendix E contains a letter from the Iowa Department of Public Health providing the public health basis for the HEV.

Due to the large number of oral and written comments received, the department has posted the comments on the Air Quality Bureau's Web site at <http://www.iowadnr.com/air/afo/afo.html> as Adobe Acrobat pdf files rather than including them in separate appendices within this document. Persons without access to the internet or who may not be able to access pdf files may contact Bryan Bunton at Iowa Department of Natural Resources, Air Quality Bureau, 7900 Hickman

Road, Suite 1, Urbandale, IA 50322, by fax at (515) 242-5094, or by electronic mail at bryan.bunton@dnr.state.ia.us, to obtain a copy of the oral or written comments.

Departmental Response to Public Comments

BASIS FOR HEV/HES

- 1. Summary of Comments- How has the department chosen to set the levels of the HEV/HES standard? What public health data supports these standards? What process was used to arrive at these standards? Why not use the recommendations of the University Study or the Agency for Toxic Substances and Disease Registry (ATSDR)?**

In February 2002, in response to a request by Governor Tom Vilsack and DNR Director Jeffrey Vonk, public health and agricultural experts from the University of Iowa and Iowa State University issued the Iowa Concentrated Animal Feeding Operations Air Quality Study.

Governor Vilsack posed the following question:

Based on an analysis of peer-reviewed, duplicated, legitimate, and published scientific research, what would you recommend as Iowa or National consensus standards for any proposed substances to be regulated as emissions from CAFOs?

To which the group responded:

...the [hydrogen sulfide] concentration at a residence or public use area shall not exceed 15 ppb measured in the same manner as the property line [i.e., same methodology and 1-hour time weighted average].

The group formulated its recommendation for a health standard:

...based on a combination of data gained from relevant regulations in other states, and recommendations made by several public health related agencies, including the World Health Organization, the US Environmental Protection Agency (EPA), and the US Agency for Toxic Substances and Disease Registry (ATSDR).

To trigger regulatory action, the group added:

...It is recommended that each CAFO have up to seven days (with 48 hour notice) each calendar year when they are allowed to exceed the concentration for hydrogen sulfide.

With the rationale:

With current animal production practices, stored manure must be removed and land-applied. During these times hydrogen sulfide, ammonia and odor levels at or near production facilities may be significantly higher than during normal conditions.

Therefore, it is also recommended that provisions be made for allowable times to exceed the established standards to allow for proper manure application to land.

In its draft rulemaking, the department adopted these recommendations within the standard regulatory framework used by EPA in its National Ambient Air Quality Standards, by defining a “health effects value” (HEV) as the threshold for adverse health effects and a “health effects standard” (HES) as the threshold for regulatory intervention to abate the health effects.

The University Study authors argued that their initial proposal for a health threshold for hydrogen sulfide should be halved because hydrogen sulfide and ammonia, both lung irritants, were likely to be present at the same time:

The U.S.E.P.A. has determined that simultaneous exposure of two substances such as hydrogen sulfide and ammonia (both pulmonary irritants) results in an additive effect. Thus, in order to protect against the adverse effects of such binary mixtures the exposure limit for each should be reduced accordingly.

The physical mechanisms underlying the emissions of hydrogen sulfide and ammonia are known to be quite different (see Chapter 5 of the National Academy of Sciences report titled Air Emissions from Animal Feeding Operations: Current Knowledge, Future Needs (2003) [NAS report]). The initial data from the department’s field study indicates that high hydrogen sulfide levels and high ammonia levels do not necessarily occur at the same time; hourly hydrogen sulfide concentrations are poorly correlated with hourly ammonia concentrations. The field study data is available online at:

<http://www.iowadnr.com/air/afo/files/2003cpics.pdf>

The field study data is consistent with the observation noted in the NAS report that the physical mechanisms underlying the emissions and transport of hydrogen sulfide and ammonia are known to be quite different.

In light of this development, some members of the University Study group recommended to the Environmental Protection Commission that the department adopt a two-pollutant (“binary”) health standard of the form:

$$h = [\text{H}_2\text{S}]/30 \text{ ppb} + [\text{NH}_3]/300 \text{ ppb}$$

where [H₂S] and [NH₃] represent the monitored hourly hydrogen sulfide and ammonia concentrations, respectively. With this formulation of the health standard, a value of $h > 1$ indicates an exceedance of the threshold for adverse health effects.

The National Center for Environmental Assessment (NCEA) is the federal government agency responsible for development of cumulative risk assessment methods. The NCEA has determined that cumulative risk be only applied to chemicals that share the same mechanism of toxicity. However, hydrogen sulfide and ammonia differ in their mechanisms of causing toxicity:

Hydrogen sulfide compromises mitochondrial respiration through inhibition of cytochrome c oxidase.

Ammonia gas causes damage by reacting with tissue water to form the strongly alkaline solution, ammonium hydroxide. This reaction is exothermic and capable of causing thermal injury in the airways.

Thus, the mechanisms by which hydrogen sulfide and ammonia cause toxicity are completely different. It is appropriate to consider the concentrations of each individual component in a cumulative risk assessment if each chemical component has the same mechanism of toxicity. However, since the mechanisms of the CAFO gases are diverse and do not share a common mechanism, NCEA procedures do not allow for the grouping of individual components from CAFO gases in estimating risk (i.e., NCEA cumulative risk assessment methods do not apply to CAFO gases).

The adoption of binary or multi-pollutant health standards creates practical difficulties in solving ambient air pollution problems, and EPA has chosen not to formulate any of their national ambient air quality standards (NAAQS) as binary or multi-pollutant standards. Air pollutant levels may exceed health standards over large areas (regional air pollution problems) or small areas near the fence line (local air pollution problems). Regional scale air pollution problems are typically more difficult to solve than local problems. While local problems are often solved by establishing permit limits for a single source or facility, the solution of regional problems often requires emissions caps applicable to many facilities over a large geographic area. The NAS report indicates that the potential effects of ammonia emissions from animal feeding operations on a regional scale are “major” and the primary effects of hydrogen sulfide emissions are “significant” (page 170) only on a local scale. Creation of a binary health standard for ammonia and hydrogen sulfide could result in delays in addressing a hydrogen sulfide problem because of the difficulties solving the ammonia problem.

With this rulemaking, the department proposes to regulate hydrogen sulfide alone, rather than a binary or multi-pollutant standard. The proposal establishes a 30 ppb hydrogen sulfide HEV with a 1-hour averaging time, effectively removing the factor of two introduced by the authors of the University Study to protect against simultaneous exposures of hydrogen sulfide and ammonia.

Many commenters suggested that the department should simply adopt guidelines for minimal risk levels (MRL's) published by the Agency for Toxic Substances and Disease Registry (ATSDR). Concurrent with this rulemaking, House File 2523 proposed to establish the following new hydrogen sulfide health standards applicable to the field study:

The minimal risk levels for an airborne pollutant that is hydrogen sulfide are as follows:

(1) The short-term minimal risk level is one of the following:

(a) A concentration dose exceeding seventy parts per billion for the duration of two consecutive valid sampling weeks.

(b) A sum of the hourly average concentration doses exceeding twenty-three and fifty-two hundredths parts per million-hour for two consecutive valid sampling weeks, reduced by seven hundredths parts per million-hour for each hour for which there is no valid hourly average.

(2) The long-term minimal risk level is one of the following:

(a) A concentration dose exceeding thirty parts per billion for the duration of twelve consecutive valid sampling months.

(b) A sum of the hourly average concentration doses exceeding two hundred sixty-two and eight hundredths parts per million-hour for twelve consecutive valid sampling months, reduced by three hundredths parts per million-hour for each hour for which there is no valid hourly average.

While ATSDR guidelines are an important source of public health information, it is important to note that, according to ATSDR (<http://www.atsdr.cdc.gov/mrls.html>)

...minimal risk levels (MRL's) are not intended to define clean-up or action levels for ATSDR or other Agencies.

ATSDR's MRL's are derived for acute (1-14 days), intermediate (>14-364 days), and chronic (365 days and longer) exposure durations. While ATSDR guidelines provide a valuable starting point for an analysis of health effects, the range in the averaging periods associated with the ATSDR guidelines makes them unsuitable for direct use as regulatory standards. Sub-acute (hourly and sub-hourly) hydrogen sulfide standards promulgated by several states including California, Minnesota, Missouri and Nebraska, fall outside the scope of the ATSDR guidance.

While the levels proposed in the legislation (70 ppb and 30 ppb) were comparable to those in this rulemaking and in the University Study, the averaging periods associated with the levels proposed in the legislation (2 weeks and 12 months, respectively) are much longer than the 1-hour averaging period proposed in the University Study and the hourly and sub-hourly hydrogen sulfide standards established in many surrounding states.

In his veto message of House File 2523, Governor Vilsack made the following statements:

The health levels in this bill for hydrogen sulfide and ammonia are many times less protective of health than those imposed in surrounding states where livestock agriculture continues to thrive.

and

I believe the Department of Public Health has developed a balanced recommendation for hydrogen sulfide at 30 ppb...

In a letter to the department contained in Appendix G, the Iowa Department of Public Health states:

The best available science suggests that people may become affected at concentrations above 30 ppb if exposed for more than 1 hour...

and cited the following research supporting the proposed HEV of 30 ppb with a one hour averaging period:

Study in Dakota City and South Sioux City, Nebraska. *An association was made between visits to the hospital due to respiratory issues and exposure to ambient levels of hydrogen sulfide greater than 30 ppb measured on thirty- minute averages. See:*

Campagna D, Kathman SJ, Pierson R, Inserra SG, Phifer BL, Middleton DC, Zarus GM, White MC. (2004). Ambient hydrogen sulfide, total reduced sulfur, and hospital visits for respiratory diseases in northeast Nebraska, 1998-2000. J Expo Anal Environ Epidemiol. 14(2):180-7.

Air Pollution Study in Finland. *An association was made between people reporting more incidences of headaches, depression, tiredness, and nausea when exposed to levels of hydrogen sulfide greater than 28 ppb. See:*

Partti-Pellinen K, Marttila O, Vilkkä V, Jaakkola JJ, Jappinen P, Haahtela T. (1996). The South Karelia Air Pollution Study: effects of low-level exposure to malodorous sulfur compounds on symptoms. Arch Environ Health. 51(4):315-20.

The HEV proposed in this rulemaking is identical to the California ambient air quality standard (CAAS) for hydrogen sulfide. The California ambient air quality standard for hydrogen sulfide has been in place since 1969. The March 1999 evaluation of the public health data by the California Office of Environmental Health Hazard Assessment underlying the standard is available at:

http://www.oehha.ca.gov/air/acute_rels/pdf/7783064A.pdf

The critical health effects associated with exceedances of the CAAS are listed as headache, nausea and physiological responses to odor. A document prepared for the California Air Resources Board by the California Office of Environmental Health Hazard Assessment entitled “Hydrogen Sulfide: Evaluation of Current California Air Quality Standards with Respect to Protection of Children” is also available at:

<http://www.oehha.ca.gov/air/pdf/oehhah2s.pdf>

Based on health information provided by the Iowa Department of Public Health and the State of California, the department establishes a threshold for adverse health effects (HEV) of 30 ppb with an averaging period of 1-hour.

Many commenters expressed the concern that this rulemaking may eventually drive agriculture from the state. The department’s adoption of the CAAS for hydrogen sulfide as the health effects value for the field study should offer some reassurance to these individuals, as California

leads the nation in agricultural exports and has roughly the same number of farms as Iowa. California's leading commodity (milk and cream) originates from livestock operations. "Facts and Stats about California Agriculture" compiled by the California Farm Bureau Federation is available online at:

http://www.cfbf.com/info/docs/Farm_Facts_2002.pdf

For the reasons indicated above, the department believes that the HEV of 30 ppb (1-hour average) has a sound public health basis, and an HES incorporating seven days of exceedances represents an equitable application of the HES in rural areas.

Recommended Action: Change the level of the HEV and HES to 30 ppb (1-hr average) and remove the words "daily maximum" for the HEV in sections 32.3 and 32.4. Retain the provision that allows seven days where the HEV is exceeded before a violation of the HES occurs. Change the level of the HEV and HES to 30 ppb in Section II Data Handling Procedures of the Iowa Air Sampling Manual, and change the analyzer response check in Section IV Quality Assurance Requirements to 20-40 ppb, in accordance with the new level.

REGULATORY FRAMEWORK

2. Summary of Comments- Is the HEV/HES permanent or only used for the field study? What happens to the HEV/HES after the field study is completed? Is the HES enforceable for a particular animal feeding operation like an ambient or emissions standard?

The statute does not establish the duration of the field study. If air monitors record a violation of the HES, then the department shall conduct future rulemakings to establish plans and programs to regulate hydrogen sulfide emissions from animal feeding operations.

For future rulemakings, the department will analyze the costs of implementing plans and programs and establish the effectiveness of any proposed control strategies at reducing hydrogen sulfide emissions. The department will continue to monitor to determine if the reductions in hydrogen sulfide emissions resulting from the future rulemakings will be effective in reducing hydrogen sulfide levels at separated locations below the HES.

The department intends to review the level of the HEV/HES every five years to incorporate the latest public health information. EPA's national ambient air quality standards undergo a similar type of review on a similar five-year schedule.

The HES established in this rulemaking represents a trigger for development of plans and programs to abate hydrogen sulfide emissions from animal feeding operations. It does not represent an enforceable standard for an individual animal feeding operation.

To make it clear that the HEV/HES will only be used for the duration of the animal feeding operations field study, the title of Chapter 32 has been changed to "Animal Feeding Operations Field Study" and paragraph 32.1 "Animal Feeding Operations Field Study" has been added.

Recommended Action: Change the title of Chapter 32 from “Health Effects Value (HEV)” to “Animal Feeding Operations Field Study”, and add a paragraph in section 32.1 briefly describing the scope of the field study.

IMPLEMENTATION PLANS

3. Summary of Comments- How are types of facilities affected by plans and programs related to the types of facilities where violations of the HES have been monitored? What are the economic impacts of the plans and programs that might be triggered by this rule? If the plans and programs are triggered, who will be affected?

If air-monitoring data from the field study shows that hydrogen sulfide at a separated location exceeds the HES, the department will propose hydrogen sulfide emissions controls or management practices in subsequent rulemakings. The animal species affected, the effectiveness of the controls or management practices for reducing emissions and the cost of the controls and management practices would be defined in future rulemakings.

Future rulemakings developed by the department will be aimed at reducing emissions of hydrogen sulfide. Ammonia, odor, and dust are also primary pollutants emitted by animal feeding operations, but these will not be the focus of the reductions. The department, in collaboration with the public, technical experts, and affected stakeholders, will review potential management practices used to reduce emissions of hydrogen sulfide to determine if any may cause an increase in the emissions of ammonia, odor, or dust, and the department may rule out possible management practices based on those findings.

Recommended Action: Add text to rule in section 32.4 that specifies that any comprehensive plans and programs that are developed will be intended only to abate emissions of hydrogen sulfide.

4. After the department measures an exceedance of the health effects value near an animal feeding operation, how will it determine which animal feeding operations and manure storage structures are causing the problem?

Each monitoring site in the field study contains a hydrogen sulfide monitor, an anemometer and a wind vane. Hydrogen sulfide emissions from barns and manure storage structures at animal feeding operations are diluted and mixed by the wind before they arrive at the monitoring site. The amount of dilution and mixing are dependent on the turbulence created by buildings and trees, the atmospheric stability, wind speed, terrain and surface roughness, and other physical and meteorological parameters.

For this reason, monitoring data taken at a separated location (often located a half-mile or more from an animal feeding operation) cannot establish the impacts of different manure storage structures at an animal feeding operation on the air quality at the separated location. For similar reasons, one cannot determine the relative contributions of animal feeding operations upwind of the monitoring site from the monitoring data alone.

In monitoring applications for federally regulated pollutants, the department uses ambient monitors only to establish whether a health standard is exceeded. After an exceedance of a health standard is measured, the department uses emissions estimates for sources and dispersion models to establish culpability for the exceedance and to design a control strategy that will prevent exceedances in the future.

Recommended Action: No change.

COMMENTS REGARDING STATUTORY CONFORMITY

5. Summary of Comments- Please explain how the rule is consistent with the statutory requirement to complete the field study before setting air quality standards.

This rulemaking establishes the conditions for evaluating the hydrogen sulfide data obtained from the field study in order to establish whether development of additional plans and programs for abatement of hydrogen sulfide emissions from animal feeding operations is necessary.

Recommended Action: Revise text in section 32.4 to clearly define the conditions necessary to trigger comprehensive plans and programs and eliminate confusion about the purpose of the field study.

6. Summary of Comments- Please explain how the HEV/HES definitions in the rule are consistent with the statutory requirement to trigger plans and programs; shouldn't an exceedance of the HEV trigger the development of plans and programs rather than an exceedance of the HES?

In the initial draft of the rule, the department proposed two separate definitions:

- (1) "*Health effects value*" which means the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect, and
- (2) "*Health effects standard*" which means the level of an airborne pollutant required to trigger plans and programs to abate emissions of airborne pollutants.

In order to clearly define the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect, the department has chosen to keep the definitions of HEV and HES separate. While there is literature and research available that supports the level of 30 parts per billion over one hour average as a health concern, there is no such literature that provides a health rationale for allowing 7 exceedances of this level. The allowance of 7 exceedances to the HEV is a practical matter that provides livestock producers the opportunity for proper application of manure to land. Keeping the two definitions separate allows the department to define a level at which human health is affected, and also to define an alternate level where practical considerations can be allowed before the development of plans and programs is triggered.

The department has inserted revised text in sections 32.3 and 32.4 to more clearly explain that plans and programs are triggered only when there is an exceedance of the HES, not the HEV. However, the definitions of HEV and HES themselves have not changed from the original draft.

Recommended Action: Insert revised text in sections 32.3 and 32.4 that clearly defines the conditions necessary to trigger comprehensive plans and programs.

7. Summary of Comments- Please explain how triggering the development of plans and programs with monitoring data that is not taken at separated locations is consistent with the statute.

The department is charged with implementing the statutory language with rulemaking in a practical and technically sound manner. EPA will not allow monitoring at a location sited next to a house, because the house represents a flow obstruction that will interfere with the monitor readings. For the department, practical monitoring requirements include the availability of power and phone lines and wintertime access at the monitoring location. Residents living near monitoring sites have expressed concerns that the presence of a monitoring trailer close to their house is not aesthetically pleasing, that compressors and other air handling equipment can be noisy, and that field technicians arriving to calibrate the monitors interfere with their privacy. At each monitoring location the department must negotiate monitor siting with the property owner in a manner that is acceptable to both parties.

The department received many comments that measurements should only be taken outside the applicable separation distance and that all measurements should be taken within 300 feet of the separated location. In response to these comments, the department has established new monitor siting requirements in its final rulemaking.

For the purposes of determining a violation of the HES:

- Monitoring sites shall not be located closer than the legally required separation distance applicable at the time of construction of an animal feeding operations structure.
- The monitoring site data shall be considered to be taken at a separated location if the monitor is located within 100 meters of the following:
 - (1) A structure that constitutes the separated location.
 - (2) The boundary of a public use area.

Recommended Action: Revise Iowa Air Sampling Manual “monitoring sites” section so that sites eligible for comparison with the HES must meet standard EPA siting criteria, must be located within 100 meters of a separated location, and must be outside of the separation distance.

8. Summary of Comments- Why aren’t sources of hydrogen sulfide other than animal feeding operations going to be regulated?

The department has the general authority under Iowa Code section 455B.133 to establish rules to regulate emissions of hydrogen sulfide from all facilities in the State of Iowa. However, the

general assembly has specifically directed the department, in Iowa Code section 459.207, to address the issue of hydrogen sulfide emissions from animal feeding operations.

The purpose of the Iowa Concentrated Animal Feeding Operations Air Quality Study was to establish recommendations to protect all citizens in the state of Iowa, not just those living near animal feeding operations. In the report, it is recommended that statewide ambient air standards be established for ammonia and hydrogen sulfide. In April 2003, in order to implement these recommendations, the department proposed statewide ambient air quality standards for ammonia and hydrogen sulfide that would have applied outside of the property of all sources. However, after adoption by the Environmental Protection Commission, the standards were nullified by the Iowa general assembly. In a letter to the department, some legislators stated that one of the main reasons for nullification of the standards is that they applied to all business and industry, not just animal feeding operations. Hence, the effort was deemed too broad. In this rulemaking, the department is taking a more narrow approach that is closely aligned with Iowa Code section 459.207 by setting an HEV/HES that is only applicable for the animal feeding operations field study.

Recommended Action: No change.

9. Summary of Comments- Please explain how the rule can neglect odor and ammonia and still be consistent with the statute.

The statute requires monitoring for hydrogen sulfide, ammonia and odor near animal feeding operations. It does not require that the department propose health standards for hydrogen sulfide, ammonia and odor simultaneously. The department may undertake rulemakings to address ammonia and odor at a later date.

Recommended Action: No change.

10. Summary of Comments- Please explain how the rule can allow for air pollution controls to be implemented prior to December 1, 2004 and still be consistent with the statute.

The initial draft of this rulemaking, contained the provision:

Additional air pollution controls included in comprehensive plans and programs shall not be implemented prior to December 1, 2004.

This statement is similar, but not identical to, that found in Iowa Code section 459.207:

...in no event shall the plans and programs provide for the enforcement of an air quality standard prior to December 1, 2004.

The department has removed the statement from the rule. Should an air quality standard be promulgated subsequent to this rulemaking, the department will not enforce the standard until after December 1, 2004.

Recommended Action: Remove text in proposed rule that references December 1, 2004.

11. Summary of Comments- Please explain the department's authority to establish this rule.

The authority of the department to conduct a field study, and to determine whether baseline data from the field study demonstrates to a reasonable degree of scientific certainty that airborne pollutants emitted by an animal feeding operation are present at a separated location at levels commonly known to cause a material and verifiable adverse health effect, is contained in Iowa Code section 459.207(2), which states:

The department shall conduct a comprehensive field study to monitor the level of airborne pollutants emitted from animal feeding operations in this state, including but not limited to each type of confinement feeding operation structure.

These rules are intended to implement Iowa Code section 459.207 and Iowa Code section 455B.133.

Recommended Action: No change.

12. Summary of Comments- Please explain why the department's currently convened workgroup meetings to discuss best management practices, emissions estimation techniques, and dispersion modeling techniques applicable to animal feeding operations, do not constitute development of plans and programs in violation of the statute. Please explain how workgroup members were chosen.

The work group discussions do not constitute the development of plans and programs. Instead, the department's current effort is to develop a working understanding of the complex technical issues involved in air quality issues associated with animal feeding operations. This effort requires an ongoing dialog with experts. If and when the department determines that development of plans and programs is appropriate, then the department will begin the rulemaking process, as required by Iowa Code sections 17A.2(11) and 17A.3.

For the workgroups, the department solicited participation from organizations with working knowledge of agricultural practices and technical expertise. Work group participants include US EPA, Iowa State University, University of Iowa, Iowa Department of Public Health, Iowa Department of Economic Development, National Soil Tilth Laboratory, Iowa CCI, Iowa State Association of Counties, Izaak Walton League, Iowa Air Emissions Assistance Program, the Iowa Chapter of Sierra Club, and DNR. As of this date, agricultural commodity groups and industrial associations invited to participate in the work groups have attended but chosen not to participate in the workgroup activities.

Recommended Action: No change.

COMMENTS REGARDING IOWA AIR SAMPLING MANUAL

13. Summary of Comments- Why isn't the required probe height closer to the height where people will be breathing the air?

The rationale for the lower limit on probe height is that elevating the probe so that it is not easy to reach makes it less likely that it may be subject to tampering; the rationale for the higher limit is that it allows sampling from flat roofed buildings (such as school buildings) where people often spend time. In rural areas, monitors will most likely be operated from trailers, where the probe height will be close to the 3-meter lower limit for vertical probe placement. This will be as close as is practical to the "breathing zone" for the rural residents. The requirement that the height of the probe be from 3 to 15 meters is uniform for all federal ambient monitoring standards. (The lone exception is for micro-scale carbon monoxide "roadways effect".)

Recommended Action: No change.

14. Summary of Comments- Why doesn't the department use less expensive portable monitors to measure hydrogen sulfide?

A Technical Advisory Group (TAG) consisting of stakeholders and experts in the field of ambient air monitoring was formed to assist with determining monitoring instrumentation and methodology for the animal feeding operations comprehensive field study mandated in Iowa Code section 459.207. The group meetings provided attendees a chance to offer recommendations and to suggest alternative monitoring methods or approaches to the department. TAG meetings were held on June 11 and June 25, 2002, at the Air Quality Bureau. There was consensus among the TAG members that the measurement methods for hydrogen sulfide, which form the basis for compliance monitoring in other agricultural states, represent the best currently available monitoring methods to form the basis of a regulatory program.

The method selected for monitoring H₂S uses an EPA reference method analyzer for sulfur dioxide that has been modified by the manufacturers to measure H₂S. This modification consists of the addition of a thermal oxidizer to the monitor design. By determining the difference in concentration between an air sample that has passed through the oxidizer when compared with the concentration of an identical air sample that has bypassed the oxidizer, the H₂S concentration is obtained.

The EPA reference method monitors incorporated in the design of the H₂S are practical and suitable for regulatory purposes. They have well defined quality assurance procedures and acceptable and documented precision and accuracy. However, one important flaw in the design of this type of monitor is that the thermal oxidizer, although optimized by the vendor for measurement of H₂S, may not be perfectly selective. Compounds like methyl mercaptan may be converted by the oxidizer and erroneously recorded as H₂S. This potential for interference is an undesirable characteristic of the selected monitoring method. However, these instruments are less expensive than research grade instruments, do not require constant operator attention, and are sturdy enough to be used in the field. Thermal oxidizer-based ambient monitoring methods

have been successfully used for several years in Nebraska, North Carolina and Missouri. The maintenance and calibration schedule used in Missouri is similar to the Iowa proposal.

While the department believes the type of hydrogen sulfide monitors selected for the field study will produce the best data currently available to guide decision-makers, it acknowledges that the more affordable lead acetate tape monitors have become increasingly popular with producers and have provided useful data for health studies. Should plans and programs requiring that measurements of hydrogen sulfide emissions from animal feeding operations be developed, the department will carefully consider using this type of monitor.

Recommended Action: No change.

15. Summary of Comments- Why are seven days of high hydrogen sulfide levels allowed before an exceedance of the health effects standard may be recorded?

Please refer to Summary of Comments #6 for departmental response.

Recommended Action: No change.

16. Summary of Comments- Why are the data from monitoring sites that are not separated locations available to the public?

It is departmental policy to make all environmental monitoring data available to the public. According to Iowa Code section 459.207, only monitoring data gathered at separated locations may be used to trigger the plans and programs to abate airborne pollutants from animal feeding operations. However, data gathered at other locations provides valuable information to the department and the public concerning potential ambient air exposures that occur off the property of the animal feeding operation, and emissions resulting from particular types of manure storage and management practices. The final rule includes a provision that monitoring data for hydrogen sulfide will be uploaded to EPA's publicly available Air Quality System (AQS) database.

Recommended Action: No change.

17. Summary of Comments- How is uncertainty in the hydrogen sulfide monitoring data quantified?

The department uses standard EPA methodology to quantify the precision of the monitoring data as specified in 40 CFR Pt 58 Appendix A. Site operators test the monitors every two weeks by comparing the monitored readings to certified bottled gas values that are comparable to the HES. Results of these checks are used to determine whether the network satisfies EPA goals for precision of the network.

Recommended Action: No change.

18. Summary of Comments- Please explain what is meant by the natural background for hydrogen sulfide.

The natural background of an air pollutant is the level of a pollutant not attributable to man made sources. More generally, the background pollution levels relative to a particular source of air pollution are the pollutant levels present at a given location in the absence of the source. At a monitoring location where the background is isotropic, the terrain is flat, and there is a single large air pollutant source, one can estimate the background by determining pollutant levels when wind blows in such a manner that the monitor is upwind of the pollutant source.

Recommended Action: No change.

19. Summary of Comments- Are the quality assurance project plan and standard operating procedures available to the public?

The quality assurance project plans and standard operating procedures for the field study are available from the department upon request.

Recommended Action: No change.

MISCELLANEOUS COMMENTS

20. Summary of Comments- Monitoring costs should not be borne by taxpayers but should be included as a cost of doing business.

The statute specifies that the department shall carry out the field study. The department would need special legislative authority to levy fees that are not deposited in the general fund. The department may not set a fee to pay for monitoring network expenses unless this legislative authority has been granted.

Recommended Action: No change.

21. Summary of Comments- Resources should be directed towards new technology.

The department has been directed to perform the field study by the Iowa general assembly and is not free to redirect these resources into other areas.

Recommended Action: No change.

22. Summary of Comments- The Iowa general assembly should allow cities and counties local control to site large AFO's.

The department does not have the authority to establish local control over the siting of large AFO's.

Recommended Action: No change.

23. Summary of Comments- The Animal Agriculture Consulting Organization (AACO) should be reinstated.

The Animal Agriculture Consulting Organization (AACO) was created in 1995 by the Iowa general assembly to consult with the department in establishing rules and implementing laws related to agriculture. The group, comprised of industry and government representatives, was repealed in 2002 with the passage of Senate File 2293.

Recommended Action: No change.

QUESTIONS FROM THE ADMINISTRATIVE RULES REVIEW COMMITTEE

Questions from the Administrative Rules Review Committee (ARRC) are taken directly from the minutes of the February 2004 ARRC meeting, in italics below.

24. ...[Representative] Carroll asked unanimous consent to withdraw the motion for a regulatory analysis and inquired about ISU's recommendation of 30 ppb subsequent to the joint university recommendation of 15 ppb for hydrogen sulfide.

Response: Iowa State University suggested that the department adopt guidelines for minimal risk levels (MRL's) published by the Agency for Toxic Substances and Disease Registry (ATSDR) of 30 ppb for intermediate exposure durations (>14-364 days). While ATSDR guidelines are an important source of public health information, according to ATSDR:

“minimal risk levels (MRL's) are not intended to define clean-up or action levels for ATSDR or other Agencies”.

ATSDR's MRL's are derived for acute (1-14 days), intermediate (>14-364 days), and chronic (365 days and longer) exposure durations. While ATSDR guidelines provide a valuable starting point for an analysis of health effects, the indeterminacy in the averaging periods associated with the ATSDR guidelines makes them unsuitable for direct use as regulatory standards. Sub-acute (hourly or sub-hourly) hydrogen sulfide standards promulgated by several states including California, Minnesota, Missouri and Nebraska fall outside the scope of the ATSDR guidance.

Recommended Action: No change.

25. ...[Representative] Carroll suggested that the 15 ppb be identified in the rules as a measure for purposes of the field study but questioned the inclusion of the words "for purposes of the field study" in regard to comprehensive plans and programs in 32.2(1).

Response: The HES established in this rulemaking represents a trigger for development of plans and programs to abate airborne pollutants emitted by animal feeding operations. It does not represent an enforceable standard for an individual animal feeding operation.

Recommended Action: Remove the phrase “for purposes of the field study”. Insert revised text in section 32.4 that more clearly defines the conditions necessary to trigger comprehensive plans and programs and also eliminates confusion about the purpose of the field study. Change the title of Chapter 32 from “Health Effects Value (HEV)” to “Animal Feeding Operations Field Study.”

26. ...[Senator] Kibbie commented on declining school populations and abandoned houses in rural areas and expressed the hope that the committee would not stand in the way of EPC's efforts to improve the quality of Iowa's air. [Representative] Eichhorn concurred that Iowans want clean air; but, concerned that establishing too strict a standard for hydrogen sulfide may have a disproportionate adverse effect on small operations, he encouraged the department to check with the universities as to their recommendations.

Response: Neither Iowa State University nor the University of Iowa submitted official public comment on the proposed rule. However, Iowa State University did submit public testimony at the December meeting of the Environmental Protection Commission supporting adoption of the ATSDR levels.

The department continues to maintain a close working relationship with both Iowa State University and the University of Iowa. Several representatives from each are currently participating in the department’s animal feeding operations technical workgroups on emissions, modeling, and best management practices.

Recommended Action: No change.

Appendix A: Iowa Code section 459.207

459.207 Animal Feeding Operations -- Airborne Pollutants Control.

1. As used in this section, unless the context otherwise requires:
 - a. "Airborne pollutant" means hydrogen sulfide, ammonia, or odor.
 - b. "Separated location" means a location or object from which a separation distance is required under section 459.202 or 459.204, other than a public thoroughfare.
2. The department shall conduct a comprehensive field study to monitor the level of airborne pollutants emitted from animal feeding operations in this state, including but not limited to each type of confinement feeding operation structure.
3.
 - a. After the completion of the field study, the department may develop comprehensive plans and programs for the abatement, control, and prevention of airborne pollutants originating from animal feeding operations in accordance with this section. The comprehensive plans and programs may be developed if the baseline data from the field study demonstrates to a reasonable degree of scientific certainty that airborne pollutants emitted by an animal feeding operation are present at a separated location at levels commonly known to cause a material and verifiable adverse health effect. The department may adopt any comprehensive plans or programs in accordance with chapter 17A prior to implementation or enforcement of an air quality standard but in no event shall the plans and programs provide for the enforcement of an air quality standard prior to December 1, 2004.
 - b. Any air quality standard established by the department for animal feeding operations shall be based on and enforced at distances measured from a confinement feeding operation structure to a separated location. In providing for the enforcement of the standards, the department shall take all initial measurements at the separated location. If the department determines that a violation of the standards exists, the department may conduct an investigation to trace the source of the airborne pollutant. This section does not prohibit the department from entering the premises of an animal feeding operation in compliance with section 455B.103. The department shall comply with standard biosecurity requirements customarily required by the animal feeding operation which are necessary in order to control the spread of disease among an animal population.
 - c. The department shall establish recommended best management practices, mechanisms, processes, or infrastructure under the comprehensive plans and programs in order to reduce the airborne pollutants emitted from an animal feeding operation.
 - d. The department shall provide a procedure for the approval and monitoring of alternative or experimental practices, mechanisms, processes, or infrastructure to reduce the airborne pollutants emitted from an animal feeding operation, which may be incorporated as part of the comprehensive plans and programs developed under this section.

Appendix B: Proposed Rule in Notice of Intended Action ARC 3092B

Item 1. Add the following NEW definitions to rule 20.2 as follows in alphabetical order.

“Health effects value” means the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect.

“Health effects standard” means the level of an airborne pollutant required to trigger plans and programs to abate emissions of airborne pollutants.

“Separated location” means a location or object from which a separation distance is required under Chapters 65.3(3) and 65.11(1), other than a public thoroughfare.

Item 2. Amend Chapter 32 as follows.

CHAPTER 32 Health Effects Value (HEV)

32.1. Health Effects Value for Hydrogen Sulfide.

The animal feeding operations (as defined in 567 IAC 65.1(455B)) health effects value for hydrogen sulfide is 15 ppb, daily maximum one-hour average as measured near a separated location.

Health Effects Standard for Hydrogen Sulfide.

The animal feeding operations (as defined in 567 IAC 65.1(455B)) health effects standard for hydrogen sulfide is 15 ppb, daily maximum one-hour average, not to be exceeded more than 7 times per year, as measured near a separated location.

32.2 Conditions for Development of Additional Air Pollution Control Programs Based on the Results of the Animal Feeding Operations Field Study.

(1) For purposes of the field study, comprehensive plans and programs may be developed if the baseline data from the field study demonstrates to a reasonable degree of scientific certainty that hydrogen sulfide emitted by an animal feeding operation (as defined in 567 IAC 65.1(455B)) is present at a separated location at levels exceeding the health effects standard.

(2) Additional air pollution controls included in comprehensive plans and programs shall not be implemented prior to December 1, 2004.

32.3 Iowa Air Sampling Manual.

Monitor siting requirements, data handling procedures, approved monitoring methods and equipment, quality assurance requirements, and requirements for public availability of the data for determining compliance with the animal feeding operations health effects value for hydrogen sulfide shall be in accordance with the “Iowa Air Sampling Manual*” adopted by the Commission on (DATE), 2004, and adopted by reference herein.

*Available from the department.

Iowa Ambient Air Sampling Manual

(Version 11/17/03)

This manual contains monitor siting requirements, data handling procedures, approved monitoring methods and equipment, quality assurance requirements, and requirements for public availability of data required to implement the Health Effects Value (HEV) and Health Effects Standard (HES) for hydrogen sulfide (H₂S) as described in Chapter 32 of 567 (455B).

I. Monitor Siting Requirements

Monitoring Sites. Monitors should be sited within 100 meters of the closest portion of the separated location, and must be sited within 300 meters of the closest portion of the separated location.

Flow Obstructions. An object near the monitoring site is defined to be an obstruction if it protrudes above the monitoring probe. If the obstruction is higher than the probe inlet, the monitor must be sited so that the distance from the inlet to the obstruction must be at least twice the height that the obstruction protrudes above the inlet. Trees that represent an obstruction must be farther than 10 meters from the probe.

Probe Inlet Height. The probe inlet at a monitoring site must be from 3 to 15 meters above the ground.

Local Sources. Monitors should be sited to avoid the influences of local sources that may make it difficult to interpret the monitoring data.

Minimum Separation from Roadways. The minimum separation from roadways shall be determined from the following table:

Roadway average daily traffic, vehicles per day	Minimum separation distance ¹ (meters)
Less than or equal to 10,000	10
15,000	20
20,000	30
40,000	50
70,000	100
Greater than or equal to 110,000	250

¹Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

II. Data Handling Procedures

The Hydrogen Sulfide HEV. The health effects value (HEV) for hydrogen sulfide is 15 parts per billion (ppb) daily maximum hourly average. A daily maximum hourly average of 16 ppb is

the lowest value that exceeds the hydrogen sulfide HEV. The HEV represents the threshold for adverse health effects.

The Hydrogen Sulfide HES. The health effects standard (HES) for hydrogen sulfide is met at a monitoring site when the annual eighth-highest daily maximum hourly average concentration is less than or equal to 15 ppb. An annual eighth-highest daily maximum hourly average of 16 ppb is the lowest value that exceeds the hydrogen sulfide HES. The HES represents the trigger level for the development of plans and programs to mitigate emissions from animal feeding operations.

Computation of a Daily Maximum One-hour Average. To determine whether an exceedance of the HEV or HES for hydrogen sulfide has been measured, hourly averages must first be computed. An hourly average is considered valid if at least 45 minutes of valid averages are recorded by the data acquisition system. A sampling day consists of 24 non-overlapping hours beginning from midnight on a given day to midnight on the following day. To determine the daily maximum one-hour average, each of the valid hourly concentrations associated with a sampling day shall be truncated to 1 ppb, and the maximum hourly average value for the sampling day determined. Within this manual, years, days and hours associated with the monitoring data shall be recorded in Central Standard Time (CST), according to the United States Environmental Protection Agency (EPA) convention for continuous monitoring data. Hourly averages are associated with the start hour of the period; for example, an hourly average of the data taken from 1 A.M. to 2 A.M. CST on a given day is associated with the 1 A.M. hour of the day.

Valid Monitoring Days. At a given monitoring site, a day of continuous monitoring data is valid if:
at least 75 percent (%) (18 hours) of valid hourly averages have been recorded, or
fewer than 18 valid hourly averages have been recorded, but the maximum hourly average of the available data exceeds 15 ppb. (i.e., a maximum hourly average of 16 ppb or greater)

Comparison of monitoring data with the HES. The HES is met at a monitoring site when the annual eighth-highest daily maximum concentration, expressed in parts per billion, is less than or equal to 15 ppb. The comparison shall be made using the most recent year of monitoring data meeting the data completeness requirements described below. The annual eighth-highest daily maximum 1-hour average concentration shall be expressed in parts per billion (with remaining digits to the right of the decimal point truncated.)

Data Completeness Requirements. The comparison of the monitoring data with the HES shall be based on a complete calendar year of air quality monitoring data.

1. This requirement is met at a monitoring site if daily maximum hourly average concentrations are available for at least 90% of the days of the year, with a minimum data completeness in any calendar quarter of at least 75% of the possible sampling days in the calendar quarter. When computing whether the minimum data completeness requirements have been met, meteorological or ambient data may be sufficient to demonstrate that meteorological conditions on missing days were not conducive to concentrations above the level of the standard. Missing days assumed less than the level of the standard are counted for the

purpose of meeting the data completeness requirement, subject to the approval of the Director.

2. A year with concentrations greater than the level of the standard shall not be ignored on the grounds that it has less than complete data. Thus, in computing the eighth highest daily maximum concentration, data from calendar quarters with less than 75% data completeness shall be included in the computation if inclusion of the data results in an annual eighth highest daily maximum hourly average concentration greater than 15 ppb.

III. Approved Monitoring Methods and Equipment

Hydrogen Sulfide. For comparison with the HEV or HES for hydrogen sulfide, the monitor design must incorporate a thermal oxidizer and an EPA reference method analyzer designed for sulfur dioxide. Instruments that meet this requirement are listed below:

1. Advance Pollution Instrumentation, Model 101A
2. Thermo-Environmental Instruments, Model 45C
3. Thermo-Environmental Instruments, Model 450C or 450CTL
4. Thermo-Environmental Instruments, Model 340 Thermal Converter, operated in conjunction with a Thermo-Environmental Instruments Model 43B, 43C, or 43CTL Sulfur Dioxide Analyzer

IV. Quality Assurance Requirements

Quality Assurance Project Plans and Standard Operating Procedures. Monitors shall be operated in accordance with the quality assurance project plans and standard operating procedures approved by the department.

Precision and Accuracy Assessment. Requirements for assessing the precision and accuracy for H₂S Continuous Analyzers are indicated below:

Method	Assessment	Coverage	Minimum Frequency	Parameters Reported
H2S Analyzer Precision	Response check at 10-30 ppb	Each Analyzer	Once per 2 weeks	Actual and measured concentration
H2S Analyzer Accuracy	Response checks at zero and at least 4 of the following points: 0-10 % of full scale 15-25% of full scale 35-50% of full scale 50-70% of full scale 70-90% of full scale	1. Each analyzer 2. 25% of analyzers (at least one)	1. Once per year 2. Each calendar quarter	Actual and measured concentration at each level

Precision and Accuracy Goals. As a goal, the 95% probability limits for precision should be less than $\pm 15\%$. At 95% probability limits, the accuracy for hydrogen sulfide should be less than $\pm 20\%$. Calculations of precision and accuracy for hydrogen sulfide will follow the procedures for gaseous pollutants in the United States Code of Federal Regulations (40 CFR Part 58, Appendix A).

V. Public Availability of Data

Hydrogen sulfide data will be uploaded into EPA's publicly available Air Quality System (AQS) database at the same frequency required for federal ambient monitoring data. Monitoring data shall be uploaded to the AQS database within 90 days of the end of the calendar quarter in which the data was taken. Numerical values associated with invalid hourly data due to instrument malfunctions or calibrations will not be entered into AQS; explanations for each hour of missing data will be entered into the database following EPA's guidance for data coding.

Appendix C: Recommended Final and Adopted Rule

ITEM 1. Adopt the following new chapter:

CHAPTER 32

Animal Feeding Operations Field Study

567—32.1(455B) Animal Feeding Operations Field Study. The department shall conduct a field study to measure the levels of hydrogen sulfide, ammonia and odor near “animal feeding operations,” as defined in 567-65.1(455B).

567—32.2(455B) Definitions. For the purposes of this chapter, the following terms shall have the meaning indicated in this chapter.

“Health effects standard” means the level of an airborne pollutant required to trigger plans and programs to abate emissions of airborne pollutants.

“Health effects value” means the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect.

“Separated location” means a location or object from which a separation distance is required under Iowa Code sections 455B.134, 459.202 or 459.204, other than a public thoroughfare.

567—32.3(455B) Exceedance of the Health Effects Value (HEV) for Hydrogen Sulfide. The health effects value for hydrogen sulfide is exceeded at a monitoring site when the one-hour average concentration exceeds 30 ppb.

567—32.4(455B) Exceedance of the Health Effects Standard (HES) for Hydrogen Sulfide. The health effects standard for hydrogen sulfide is exceeded at a monitoring site when the daily maximum one-hour average concentration exceeds 30 ppb more than seven times per year. The

department shall develop plans and programs to abate hydrogen sulfide emissions from animal feeding operations if hydrogen sulfide levels measured at a separated location exceed the health effects standard for hydrogen sulfide.

567—32.5(455B) Iowa Air Sampling Manual. Monitor siting requirements, data handling procedures, approved monitoring methods and equipment, quality assurance requirements, and requirements for public availability of the data for determining compliance with the HEV or HES for hydrogen sulfide shall be in accordance with the “Iowa Air Sampling Manual*” adopted by the commission on [date to be inserted] and adopted by reference herein.

These rules are intended to implement Iowa Code sections 459.207 and 455B.133.

*Available from the department.

Iowa Air Sampling Manual (Version 7/19/04)

This manual contains monitor siting requirements, data handling procedures, approved monitoring methods and equipment, quality assurance requirements, and requirements for public availability of data required to implement the Health Effects Value (HEV) and Health Effects Standard (HES) for hydrogen sulfide (H₂S) as described in Chapter 32 of 567 (455B).

I. Monitor Siting Requirements

Monitoring Sites. For the purposes determining a violation of the HES

- 1) Monitoring sites shall not be located closer than the legally required separation distance applicable at the time of construction of an animal feeding operations structure.
- 2) Monitoring data is considered to be taken at a separated location if the monitor is located within 100 meters of the following:
 - a) A structure that constitutes the separated location.
 - b) The boundary of a public use area.

The department may conduct monitoring at locations that do not meet these requirements with objectives such as the assessment of source contributions, determination of background concentrations or assessment of community exposure.

Flow Obstructions. An object near the monitoring site is defined to be an obstruction if it protrudes above the monitoring probe. If the obstruction is higher than the probe inlet, the monitor must be sited so that the distance from the inlet to the obstruction must be at least twice the height that the obstruction protrudes above the inlet. Trees that represent an obstruction must be farther than 10 meters from the probe.

Probe Inlet Height. The probe inlet at a monitoring site must be from 3 to 15 meters above the ground.

Local Sources. Monitors should be sited to avoid the influences of local sources that may make it difficult to interpret the monitoring data.

Minimum Separation from Roadways. The minimum separation from roadways shall be determined from the following table:

Roadway average daily traffic, vehicles per day	Minimum separation distance ¹ (meters)
Less than or equal to 10,000	10
15,000	20
20,000	30
40,000	50
70,000	100
Greater than or equal to 110,000	250

¹Distance from the edge of the nearest traffic lane. The distance for intermediate traffic counts should be interpolated from the table values based on the actual traffic count.

II. Data Handling Procedures

The Hydrogen Sulfide HEV. The health effects value (HEV) for hydrogen sulfide is 30 parts per billion (ppb) for a one-hour average. An hourly average of 31 ppb is the lowest value that exceeds the hydrogen sulfide HEV. The HEV represents the level of an airborne pollutant commonly known to cause a material and verifiable adverse health effect.

The Hydrogen Sulfide HES. The health effects standard (HES) for hydrogen sulfide is met at a monitoring site when the annual eighth-highest daily maximum hourly average concentration is less than or equal to 30 ppb. An annual eighth-highest daily maximum hourly average of 31 ppb is the lowest value that exceeds the hydrogen sulfide HES. The HES represents the level of an airborne pollutant required to trigger plans and programs to abate emissions of airborne pollutants.

Computation of a Daily Maximum One-hour Average. To determine whether an exceedance of the HEV or HES for hydrogen sulfide has been measured, hourly averages must first be computed. An hourly average is considered valid if at least 45 minutes of valid averages are recorded by the data acquisition system. A sampling day consists of 24 non-overlapping hours beginning from midnight on a given day to midnight on the following day. To determine the daily maximum one-hour average, each of the valid hourly concentrations associated with a

sampling day shall be truncated to 1 ppb, and the maximum hourly average value for the sampling day determined. Within this manual, years, days and hours associated with the monitoring data shall be recorded in Central Standard Time (CST), according to the United States Environmental Protection Agency (EPA) convention for continuous monitoring data. Hourly averages are associated with the start hour of the period; for example, an hourly average of the data taken from 1 A.M. to 2 A.M. CST on a given day is associated with the 1 A.M. hour of the day.

Valid Monitoring Days. At a given monitoring site, a day of continuous monitoring data is valid if:

at least 75 percent (%) (18 hours) of valid hourly averages have been recorded, or fewer than 18 valid hourly averages have been recorded, but the maximum hourly average of the available data exceeds 30 ppb. (i.e., a maximum hourly average of 31 ppb or greater)

Comparison of monitoring data with the HES. The HES is met at a monitoring site when the annual eighth-highest daily maximum concentration, expressed in parts per billion, is less than or equal to 30 ppb. The comparison shall be made using the most recent year of monitoring data meeting the data completeness requirements described below. The annual eighth-highest daily maximum 1-hour average concentration shall be expressed in parts per billion (with remaining digits to the right of the decimal point truncated.)

Data Completeness Requirements. The comparison of the monitoring data with the HES shall be based on a complete calendar year of air quality monitoring data.

1. This requirement is met at a monitoring site if daily maximum hourly average concentrations are available for at least 90% of the days of the year, with a minimum data completeness in any calendar quarter of at least 75% of the possible sampling days in the calendar quarter. When computing whether the minimum data completeness requirements have been met, meteorological or ambient data may be sufficient to demonstrate that meteorological conditions on missing days were not conducive to concentrations above the level of the standard. Missing days assumed less than the level of the standard are counted for the purpose of meeting the data completeness requirement, subject to the approval of the Director.
2. A year with concentrations greater than the level of the standard shall not be ignored on the grounds that it has less than complete data. Thus, in computing the eighth- highest daily maximum concentration, data from calendar quarters with less than 75% data completeness shall be included in the computation if inclusion of the data results in an annual eighth-highest daily maximum hourly average concentration greater than 30 ppb.

IV. Approved Monitoring Methods and Equipment

Hydrogen Sulfide. For comparison with the HEV or HES for hydrogen sulfide, the monitor design must incorporate a thermal oxidizer and an EPA reference method analyzer designed for sulfur dioxide. Instruments that meet this requirement are listed below:

1. Advance Pollution Instrumentation, Model 101A
2. Thermo-Environmental Instruments, Model 45C

3. Thermo-Environmental Instruments, Model 450C or 450CTL
4. Thermo-Environmental Instruments, Model 340 Thermal Converter, operated in conjunction with a Thermo-Environmental Instruments Model 43B, 43C, or 43CTL Sulfur Dioxide Analyzer

VI. Quality Assurance Requirements

Quality Assurance Project Plans and Standard Operating Procedures. Monitors shall be operated in accordance with the quality assurance project plans and standard operating procedures approved by the department.

Precision and Accuracy Assessment. Requirements for assessing the precision and accuracy for H₂S Continuous Analyzers are indicated below:

Method	Assessment	Coverage	Minimum Frequency	Parameters Reported
H ₂ S Analyzer Precision	Response check at 20-40 ppb	Each Analyzer	Once per 2 weeks	Actual and measured concentration
H ₂ S Analyzer Accuracy	Response checks at zero and at least 4 of the following points: 0-10 % of full scale 15-25% of full scale 35-50% of full scale 50-70% of full scale 70-90% of full scale	1. Each Analyzer 2. 25% of analyzers (at least one)	1. Once per year 2. Each calendar quarter	Actual and measured concentration at each level

Precision and Accuracy Goals. As a goal, the 95% probability limits for precision should be less than $\pm 15\%$. At 95% probability limits, the accuracy for hydrogen sulfide should be less than $\pm 20\%$. Calculations of precision and accuracy for hydrogen sulfide will follow the procedures for gaseous pollutants in the United States Code of Federal Regulations (40 CFR Part 58, Appendix A).

VII. Public Availability of Data

Hydrogen sulfide data will be uploaded into EPA's publicly available Air Quality System (AQS) database at the same frequency required for federal ambient monitoring data. Monitoring data shall be uploaded to the AQS database within 90 days of the end of the calendar quarter in which the data was taken. Numerical values associated with invalid hourly data due to instrument

malfunctions or calibrations will not be entered into AQS; explanations for each hour of missing data will be entered into the database following EPA's guidance for data coding.

Appendix D: Governor Vilsack's Veto Message for House File 2523

JUN-21-2004 16:28

GOVERNOR OFFICE

1 515 2816611 P.02/03



THOMAS J. VILSACK
GOVERNOR

OFFICE OF THE GOVERNOR

SALLY J. PEDERSON
LT. GOVERNOR

April 13, 2004

The Honorable Christopher Rants
Speaker of the House
State Capitol Building
LOCAL

Dear Speaker Rants:

I hereby transit **House File 2523**, an Act providing for the regulation of air quality, and making penalties applicable.

Although **House File 2523** was touted as the "air quality bill" by legislators, the fact is that the Minimal Risk Levels established in this bill fail to adequately protect the health of Iowans. The levels established in the bill misrepresent the Center for Disease Control's recommendations by allowing exposures for longer time periods than recommended and by failing to require immediate responses to exceedences of those standards.

The health levels in this bill for hydrogen sulfide and ammonia are many times less protective of health than those imposed in surrounding states where livestock agriculture continues to thrive. Missouri, Minnesota, and Nebraska all have standards that allow violations at most for two days out of any five, and generally not more than twice a year. This bill would require fourteen consecutive days of violations under one provision before exceeding the standard. Setting such a lenient standard, as designated in this bill, does not address the problem and threatens to undermine the credibility of the livestock industry in Iowa.

This bill would also relinquish authority for establishing and amending ambient air quality standards to the federal government. This approach is problematic because it prevents the Environmental Protection Commission from developing an ambient standard to address issues that may be unique to Iowa and may not compel the Environmental Protection Agency (EPA) to take action. It is appropriate for states to maintain this authority given the unique circumstances states face and given the problems with a one-size-fits-all approach that is often pursued by the EPA. Without ambient standards, it is impossible to appropriately balance the need to protect public health with the practical and financial burdens of requiring emissions controls.

Just two years ago, the legislature worked with my administration on a balanced policy regulating livestock confinements, including air quality. I am disappointed in the

STATE CAPITOL DES MOINES, IOWA 50319 515 281-5211 FAX 515-281-6611

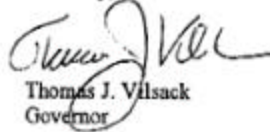


legislature's unwillingness to continue that consensus work this year by refusing my offer to develop a regulatory standard that protects human health. At a time when Iowans should be coming together to solve difficult problems, majority legislators have chosen to drive a political wedge in this already divisive issue.

For the above reasons, I hereby respectfully disapprove **House File 2523**. I remain confident that we can develop air quality standards that maintain a strong livestock industry and protect the health of all Iowans, including those most susceptible to respiratory problems. I commit my administration to striking that balance.

I direct the Department of Natural Resources to move forward with establishing an administrative standard, monitoring, and developing best management practices. I believe the Department of Public Health has developed a balanced recommendation for hydrogen sulfide at 30 ppb over a 60-minute average, allowing for seven exceedences on an annual basis. An air quality standard at this level will protect the health of Iowans and maintain a healthy livestock industry, and I urge the Environmental Protection Commission to give serious consideration to this recommendation.

Sincerely,



Thomas J. Vilsack
Governor

TJV:jmc

cc: Secretary of the Senate
Chief Clerk of the House

Appendix E: Letter from Iowa Department of Public Health

How has the department chosen to set the levels of the HEV/HES standard?

Previously, Iowa State University and the University of Iowa reviewed the literature and produced a document (hence, the University Report) that recommended that the Agency for Toxic Substances & Disease Registry (ATSDR) Minimal Risk Level (MRL) for the intermediate exposure of hydrogen sulfide be divided in half and use that as the standard.

MRLs are estimates of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse health effects over a specified duration of exposure. It is important to note that MRLs are not intended to be standards. These estimates, which are intended to serve as screening levels, are used by ATSDR health assessors to identify contaminants and potential health effects that may be of concern at hazardous waste sites. The established intermediate-duration MRL is 30 ppb. Intermediate duration is defined at 15-364 days.

What public health data supports these standards?

The following are several studies that support the HEV standard of 30 ppb.

Study in Dakota City and South Sioux City, Nebraska

An association was made between visits to the hospital due to respiratory issues and exposure to ambient levels of hydrogen sulfide greater than 30 ppb measured on thirty- minute averages.

Campagna D, Kathman SJ, Pierson R, Inserra SG, Phifer BL, Middleton DC, Zarus GM, White MC. (2004). Ambient hydrogen sulfide, total reduced sulfur, and hospital visits for respiratory diseases in northeast Nebraska, 1998-2000. *J Expo Anal Environ Epidemiol.* 14(2):180-7.

Air Pollution Study in Finland

An association was made between people reporting more incidences of headaches, depression, tiredness, and nausea when exposed to levels of hydrogen sulfide greater than 28 ppb.

Partti-Pellinen K, Marttila O, Vilkkä V, Jaakkola JJ, Jappinen P, Haahtela T. (1996). The South Karelia Air Pollution Study: effects of low-level exposure to malodorous sulfur compounds on symptoms. *Arch Environ Health.* 51(4):315-20.

The following study found no health effects from exposure to levels between 5 and 11 ppb hydrogen sulfide.

Geothermal Wells in Puna, Hawaii

Case-study of people exposed to hydrogen sulfide from an unplanned release from geothermal wells found no association between respiratory conditions and exposure to hydrogen sulfide concentrations in air from 5 – 11 ppb.

Brooks, B.A. (1983). Evaluation of Potential Adverse Health Effects from Short Term Exposure to Hydrogen Sulfide Resulting from an Unplanned Release from Geothermal Well in Puna, Hawaii. Hawaii State Department of Health.

Why not use the recommendations of the University Report?

The University Report recommended that an additional safety factor of 2 be applied to the ATSDR Intermediate Exposure MRLs. This was to account for the fact that CAFOs present a myriad of potential chemical exposures, in particular two – hydrogen sulfide and ammonia. The fact that people are often exposed to more than one chemical at any particular time has been recognized by the regulatory community. The National Center for Environmental Assessment (NCEA) has been tasked to develop cumulative risk assessment methods. The NCEA has determined that cumulative risk be only applied to chemicals that share the same mechanism of toxicity. However, hydrogen sulfide and ammonia differ in their mechanisms of causing toxicity:

Hydrogen sulfide compromises mitochondrial respiration through inhibition of cytochrome c oxidase.

Ammonia gas causes damage by reacting with tissue water to form the strongly alkaline solution, ammonium hydroxide. This reaction is exothermic and capable of causing thermal injury in the airways.

Thus, the mechanisms by which hydrogen sulfide and ammonia cause toxicity are completely different. It is appropriate to consider the concentrations of each individual component in a cumulative risk assessment if each chemical component has the same mechanism of toxicity. However, since the mechanisms of the CAFO gases are diverse and do not share a common mechanism, NCEA procedures do not allow for the grouping of individual components from CAFO gases in estimating risk (i.e., NCEA cumulative risk assessment methods do not apply to CAFO gases).

Furthermore, studies have established that there is an inverse relationship in hydrogen sulfide and ammonia concentrations at CAFOs. That is, when hydrogen sulfide concentration is increased, ammonia concentration is decreased (and vice versa).

Thus, there is not a sound scientific basis to use an additional safety factor of two.

Why not use the ATSDR MRL?

The best available science suggests that people may become affected at concentrations above 30 ppb if exposed for more than 1 hour:

Exposures to concentrations of hydrogen sulfide for longer than 30 minutes is associated with an increase in respiratory disease related hospital visits, in particular for asthma.

Campagna D, Kathman SJ, Pierson R, Inserra SG, Phifer BL, Middleton DC, Zarus GM, White MC. (2004). Ambient hydrogen sulfide, total reduced sulfur, and hospital visits for respiratory diseases in northeast Nebraska, 1998-2000. *J Expo Anal Environ Epidemiol.* 14(2):180-7.

Exposure to 30 ppb of hydrogen sulfide for longer than 1 hour has been associated with increases in headaches, depression, tiredness, and nausea.

Partti-Pellinen K, Marttila O, Vilkkä V, Jaakkola JJ, Jappinen P, Haahtela T. (1996). The South Karelia Air Pollution Study: effects of low-level exposure to malodorous sulfur compounds on symptoms. *Arch Environ Health.* 51(4):315-20.